

CLAIMS

1. (Amended) An information processing apparatus, comprising:

determining means for performing, on an object of which element or procedure  
5 can be described based at least on information related to time, a process based on time  
information for determining an element or procedure of said object;

executing means for executing a process based on contents of the process  
determined by said determining means; and

object management means storing said object for managing its operation and  
10 status; wherein

in the object to be processed by said information processing apparatus, different  
time-restricting condition may be imposed on every uniquely identifiable element or  
procedure defined in the object, and

said determining means selects an appropriate process at a timing of applying the  
15 time information.

2. The information processing apparatus according to claim 1, further  
comprising

event notification means registering and holding an event condition based on  
20 external information, for notifying said object management means about an event that  
occurs when the condition is satisfied; wherein

said event notification means and said object management means each include  
interface means for performing an event input/output operation; and

said executing means changes the process in an event-driven manner in response  
25 to said event input/output operation.

3. (Amended) The information processing apparatus according to claim 1,  
wherein

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said determining means has object generating means for newly generating, after determination of a process related to specific contents of the element or procedure of the object by applying time information, an object based on the result of determination; and

5        said executing means performs a process based on said generated object.

4.    The information processing apparatus according to claim 1, wherein

in the object to be processed by said information processing apparatus, a plurality of contents of elements and procedures of said object are prepared, said plurality of contents of elements and procedures are fully contained in said object as a single object, and contents are selectively determined by processing the time information.

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5. The information processing apparatus according to claim 1, wherein in the object to be processed by said information processing apparatus, contents of an element or procedure of said object can be described in a format of external reference; and

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in determining contents of an element or procedure of an object, when any item requires external reference for resolution, said determining means requests said object management means for the resolution and determines the contents of processing.

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6. The information processing apparatus according of claim 5, wherein said object management means has storing means, searching means for searching for an object stored in a storage area of said storing means, and communication means for obtaining information through a network, and in response to a request from said determining means, searches and obtains necessary information under control or through the network, and notifies said determining means about the contents, whereby the item requiring external reference is resolved and the contents of processing are determined.

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7. The information processing apparatus according to claim 1, wherein the object to be processed by said information processing apparatus has such a format of representation that a specific value or method related to its element or procedure is determined for the first time when said determining means applies the time

information.

8. The information processing apparatus according to claim 1, wherein  
when said determining means applies time of activation, the object to be  
5 processed by said information processing apparatus has a data value or method related  
to its element or procedure determined.

9. The information processing apparatus according to claim 1, wherein  
when the determining means applies virtual time of activation, the object to be  
10 processed by said information processing apparatus has a data value or method related  
to its element or procedure, based on the condition, adapted and determined.

10. The information processing apparatus according to claim 9, wherein  
the object to be processed by said information processing apparatus has contents  
15 of its element or procedure described in a form of a time-related function, and when said  
determining means applies the time information, a data value or method related to its  
element or procedure is determined.

11. (Cancelled)

20 12. The information processing apparatus according to claim 1, wherein  
in the object to be processed by said information processing apparatus,  
description simultaneously including descriptions based on a plurality of time constraints

may be made as long as there is no time crossing, on every uniquely identifiable element or procedure defined in the object; and

said determining means selects an appropriate process at a timing of applying the time information.

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13. The information processing apparatus according to claim 1, wherein time constraint related to an element or procedure defined in the object to be processed by the information processing apparatus is described as a condition of invalidating the corresponding element or procedure.

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14. The information processing apparatus according to claim 1, wherein in determining contents of an element or procedure related to the object to be processed, when there is no item that satisfies a time constraint, said determining means makes a notification to said object management means and any process related to said object thereafter is stopped.

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15. The information processing apparatus according to claim 1, wherein in determining contents of an element or procedure related to the object to be processed, when there is no item that satisfies a time related condition, said determining means makes a notification to said object management means and executes a process based on an object appropriately selected by said object management means.

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16. The information processing apparatus according to claim 12, wherein some of the time constraints imposed on the element or procedure defined in the object to be processed by said information processing apparatus may mixedly include descriptions in accordance with different scale designations; and

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said determining means includes means for selecting an actual process by mapping time constraint scales imposed on the element or procedure of the object to a

single time axis.

17. The information processing apparatus according to claim 12, wherein  
some of the time constraints imposed on the element or procedure defined in the  
5 object to be processed by said information processing apparatus may mixedly include  
descriptions in accordance with different methods of designation including absolute time  
designation, relative time designation or interval designation; and

said determining means includes means for selecting an actual process by using a  
predetermined priority with respect to descriptions of time constraints imposed on the  
10 element or procedure of said object.

18. The information processing apparatus according to claim 5, wherein  
when the object to be processed by said information processing apparatus is  
generated from an arbitrary time-constrained object as a parent, the object inherits  
15 characteristics related to the element and procedure defined in the parent object as well  
as time constraint imposed on each of the element and procedure.

19. The information processing apparatus according to claim 18, wherein  
the object to be processed by said information processing apparatus inherits each  
20 said time constraint related to the element and procedure defined by said parent object,  
and when a process related to the corresponding element and procedure is to be  
overridden, asks the parent object for delegation of authority to obtain permission of  
execution.

20. The information processing apparatus according to claim 18, wherein  
the object to be processed by said information processing apparatus individually  
25 inherits or refers to only the time constraint related to each of the element and procedure  
defined by said parent object, whereby a process dependent on a part of a process of

said parent object is described.

21. The information processing apparatus according to claim 20, wherein  
the object to be processed by said information processing apparatus asks said  
parent object for permission, when it individually inherits or refers to only the time  
constraint related to each of the element and procedure defined by said parent object.

22. The information processing apparatus according to any of claims 19 to 21,  
wherein

the object to be processed by said information processing apparatus operates a  
timing of linked processing among objects, by re-arranging, through an off-set  
designation, time constraints related to the element and procedure defined by said parent  
object.

23. The information processing apparatus according to claim 1, wherein  
said executing means has information presenting means for presenting to the user,  
at a timing of switching of a process based on contents of an element or procedure of  
the object determined by said determining means, information related to a change in the  
process, and

at a timing when object behavior changes with time, presents information related  
to the change in the object behavior to the user.

24. The information processing means according to claim 2, wherein  
said object management means registers a timing of determining contents of the  
element or procedure related to the object by the determining means in the event  
notification means beforehand, to perform scheduling of the timings of determining  
operations thereafter.

25. The information processing apparatus according to claim 24, wherein  
said object management means has registering means for registering the timing of  
determining contents of the element or procedure related to the object by said  
determining means in the event notification means to cause event firing at a timing  
5 earlier than a defined time; and

after receiving an event from said event notification means, earlier than a timing  
when contents of the element or procedure are changed by said determining means,  
information related to a change in behavior of said object is presented to the user.

10 26. The information processing apparatus according to claim 7, wherein  
the object to be processed by said information processing apparatus realizes a  
user interface, and a method of displaying a component is changed in accordance with  
applied time information.

15 27. The information processing apparatus according to claim 7, wherein  
the object to be processed by said information processing apparatus realizes a  
user interface, and  
a method of operation assigned to said component is changed in accordance with  
applied time information.

20 28. The information processing apparatus according to claim 27, wherein  
the object to be processed by said information processing apparatus realizes a  
user interface, and

25 at a timing when object behavior changes with time, the change in said object  
behavior is presented to the user by changing a component display through animation.

29. The information processing apparatus according to claim 1, comprising  
means for performing information processing involving an object of which



element or procedure can be described based on time information and an object not dependent on time information.

5           30. (Amended) An information processing method, comprising the steps of:  
determining, on an object of which element or procedure can be described at  
least on information related to time, contents of the element or procedure of the object  
based on time information;

performing information processing based on the determined contents of  
processing; and

10           performing adaptive information processing, by storing said object, managing  
operation and status, and changing contents of the element or procedure described in the  
object based on the time information; wherein

in the object to be processed by said information processing apparatus, different  
time-restricting condition may be imposed on every uniquely identifiable element or  
15 procedure defined in the object, and

said determining step includes the step of selecting an appropriate process at a  
timing of applying the time information.

20           31. (Amended) An information processing program, causing a computer to  
execute the steps of:

determining, on an object of which element or procedure can be described at  
least on information related to time, contents of the element or procedure of the object  
based on time information;

25           performing information processing based on the determined contents of  
processing; and

performing adaptive information processing, by storing said object, managing  
operation and status, and changing contents of the element or procedure described in the  
object based on the time information; wherein

in the object to be processed by said information processing apparatus, different time-restricting condition may be imposed on every uniquely identifiable element or procedure defined in the object, and

said determining step includes the step of selecting an appropriate process at a timing of applying the time information.

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32. (Amended) A computer readable recording medium, recording an information processing program causing a computer to execute the steps of:

determining, on an object of which element or procedure can be described at least on information related to time, contents of the element or procedure of the object

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based on time information;

performing information processing based on the determined contents of processing; and

5 performing adaptive information processing, by storing said object, managing operation and status, and changing contents of the element or procedure described in the object based on the time information; wherein

in the object to be processed by said information processing apparatus, different time-restricting condition may be imposed on every uniquely identifiable element or procedure defined in the object, and

10 said determining step includes the step of selecting an appropriate process at a timing of applying the time information.